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TRANSACTIONS

Effect of Feeding Vegetable Protein on Copulation and Fertilization in the Fowl.

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Since there has been no literature to my knowledge, dealing with the effect of feeding on copulation in the fowl, as well as that on the ability of the cock in the fertilization-tests hitherto undertaken, the work reported in this paper has been done to ascertain the influence of food upon the number of copulations, the effect of the difference in food given to the cock on the length of time and number cf fertile eggs produced by the mated hen, and the sex-ratio of chicks.

Feeds.– To ascertain the influence of feeding on copulation in the fowl, soy bean cake (vegetable protein) was given as the source of protein to the test lot, while fish meal (animal protein) was supplied to the control lot. Both rations were composed so as to contain the same amount of protein and other nutrients. Birds used for the experiment were selected from the respective flocks raised for four generations under similar rations, to minimize the possible effects from previous feeding.

The two rations and their components are as follows :–

Ration (parts by weight).

	Test lot (%)	Control lot (%)
Yellow corn	45	45
Rice bran	15	15
Rice refuse	17	17
Fish meal	—	20
Soy bean cake	30	—
Mineral mixture	3	3

The mineral mixture is composed of steamed bone meal 6 parts, calcium carbonate 2 parts, and sodium chloride 2 parts.

Composition.

	Test lot (%)	Control lot (%)
Moisture	11.7	11.8
Protein	20.5	21.8
Fat	6.7	7.7
Fibre	3.1	1.9
Ash	3.9	5.0
Nitrogen free extract	54.1	51.8

The Fowl used in the experiments.– The single-combed White Leghorns (two or three years old) of the same condition were selected from the above mentioned flocks to make the two lots, special attention being given in the selection of cocks, as they play an important role.

INDIVIDUAL TEST

A hen, which was isolated from cock for fifty days and tested for infertility, was mated to the specified cock but once. The cock was then removed immediately, and the eggs laid by that hen henceforth were placed in an incubator to be examined for fertility and other items.

As to the behaviour of copulation, no marked difference was observed between these two lots, except a certain tendency to be later in hours (more often in the afternoon) in the birds of test lot. The results of incubation tests are as follows, the figures showing average.

Group	Male	Female	Days during which fertilized eggs where produced	Hours from mating to the first fertilized egg laid	No. of fertilized eggs
I	Animal protein	Animal protein	12.6	61.0	7.5
II	Animal protein	Vegetable protein	10.4	44.5	7.2
III	Vegetable protein	Animal protein	10.6	62.0	6.8
IV	Vegetable protein	Vegetable protein	10.1	54.8	6.6

Generally speaking, the above results are similar with the various literatures in which the nature of food was not stated. But it may be remarked that the fertilization period of the group I in the control lot is rather longer and accordingly shows more fertility than the group IV. There were some hens in each group which produced unfertile eggs (1–3) in succession, which are not counted in the above table.

As regards the sex-ratio, no difference has been recognized between the two lots.

GROUP EXPERIMENT

In this experiment each cock was placed in a pen containing from seven to eleven hens, and the number of copulations in one day was recorded. The results are the following:

Average number of copulations (cock).

Group	Male	Female	Daylight about (5.30 A. M.) to Noon	Noon to Darkness (6.30 P. M.)	Total
I	Animal protein	Animal protein	5	13	18
II	Animal protein	Vegetable protein	8	11	19
III	Vegetable protein	Animal protein	6	11	17
IV	Vegetable protein	Vegetable protein	3	6	9

According to Upp, the number of copulations of a cock was twenty times in a day, which must have been observed under normal feeding with animal protein, though it was not mentioned. In this experiment, in cases of mating in which one or both cock and hen were fed with animal protein, the number of copulations of the cock may be considered to be normal. On the other hand, that of group IV which fell to nine, i. e. about half of the other cases, ought perhaps to be attributed to the vegetable protein in the ration.

FERTILIZATION EXPERIMENT

Each cock from the two lots was mated alternately to eight flocks, each consisting of about ten hens from those two different lots, and the eggs produced were tested for fertility. The incubation-test shows that there is no difference at all in the percentage of fertilized eggs produced by the same hen, without regard to which lot the mated cock belongs.

SUMMARY

In order to ascertain whether the feed influences copulation in the fowl, soy bean cake (vegetable protein) was given as the source of protein to a test flock raised for four generations subjected to identical feeding. Their average number of copulations was found to be nine times a day, which was about half of that in other flocks supplied with animal protein, the ration being otherwise the same.

In the vegetable protein lot, the length of time during which the fertilized eggs are laid by a hen after one mating is shorter by 2–1/2 day and the number of fertilized eggs is less by 0.9 than in the animal protein lot. As to the sex-ratio, no deviation was recognized in both lots.

As no marked difference in respect of the fertility can be noticed, so far as the practical mating is concerned, between the two lots, it can be conclu-

ded that the use of vegetable protein as the single source of protein for the production of hatching eggs is not objectionable, when only a few hens are mated with one cock. But, when hens are numerous in a pen, it should be better to supply them with animal protein.

Biochemical Studies on "Miso", Fermented Soy-bean Paste. Part III.

On the Effect of Cystine upon the Nutritive Value of "Miso-protein" when fed to Albino Rats as a Supplement to Rice.

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(Received July 16, 1935.)

INTRODUCTION

In the previous feeding experiments(1) it has been shown that "miso-protein" when added to rice diet has a high supplementary value, and compared with other proteins it is higher than "kōridōfu" (frozen soy-bean curd), though it is somewhat lower than fish protein. Thus it is evident that "miso" plays an important rōle in the nutrition of the Japanese people.

It is to be mentioned, however, that the cystine content of "miso-protein" is too low to permit the growth of rats when given as the soule source of protein in diet. The question naturally arises whether or not the supplementary value may be increased by the addition of cystine.

According to R. Takata(2) white rats fed on a diet consisting of 92.6 "miso", 57.0 dextrine, 5.0 soy-bean oil, 0.15 NaCl, 2.0 inorganic salts, 3.0 cod-liver oil and 2.0% dry yeast, failed to grow or to sustain life for a long time, but by supplementing 0.5% cystine to the above diet, the rats showed a good growth. The same kind of experiment has been carried out by S. Nakayama(3) with young rats weighing 30∼70 g..

The diets used consisted of:

	Diet No. 3 "Red-miso"	Diet No. 4 "Hatchōmiso"
Polished rice	85.8 g.	90.0 g.
"Miso"	34.0	16.0
Dextrine	—	9.7
Calcium lactate	1.0	1.0
Dry yeast	2.0	2.0
Protein in %	10.02	10.18
NaCl in %	1.4	1.6

The control animals fed on the above diets did not grow well but by adding 0.5% cystine a better result has been obtained. On the other hand, there are a number of investigators who have observed the noxious effect of over dosis of cystine. G. J. Cox, C. V. Smythe and C. F. Fischback(4) fed young rats weighing less than 60 g. on a synthetic diet containing 0.3～0.9% cystine and observed the development of acute nephrosis and hypertrophy of the kidneys. The animals lost appetite, declined in body weight and some of them finally succumbed.

Better results have been reported by H. H. Mitchell and J. R. Beadles(5) who fed rats on a diet containig 8% milk protein (skimmed milk powder) supplemented by 0.24% cystine and observed a fairly good growth and the retention of nitrogen. A. C. Curtis, L. H. Newburgh and F. H. Thomas(6) reported that an 18% casein diet containing 0.07% cystine is too low for normal growth, but when the amount reaches 2.5 times the optimum requirement, it exerts a noxious effect.

It seems thus that the favorable effect of cystine depends chiefly upon the amount given. The present experiment has been undertaken to study these relations more closely.

EXPERIMENTAL

(1) The chemical composition of the materials used in the experiment was as follows:

TABLE I.

	Water	Total-N	Crude protein	Carbo-hydrate	Crude fat	NaCl
Polished rice	6.92	1.16	7.25	78.86	0.85	——
〃 as dry matter	——	1.26	7.88	87.72	0.91	——
"Yedomiso"	44.48	1.99	12.44	27.55	2.98	6.06
"Sendaimiso"	50.29	2.04	12.75	12.84	3.98	11·54
"Hatchōmiso"	41.67	3.57	22.32	3.96	10.12	10.99

(2) Preparation of cystine.

According to the O. Folin's method(7), 500 g. of dry, washed human hair were pressed into a 3 L. hard round-bottom flask, and boiled for 15 hours with 1.5 L. of concentrated hydrochloric acid. After cooling, a greater part of the acid was neutralised with concentrated sodium hydroxide, and while hot crystallised sodium acetate was added until the congo-red reaction became negative. After standing over night, the separated cystine crystals were filtered by suction, washed with ice water, dissolved in 5% hot hydrochloric acid, and after decolorising with animal charcoal, the solution was cautiously neutralized with soda. The crystals thus separated out were collected, washed with ice water, dissolved in a 10% ammonia solution, and again precipitated by slowly adding glacial acetic acid. The yield was 96.85 g., from 1920 g. of the original material. The crystals gave no reaction with Millon's reagent and were completely decomposed by heating with glycerin over 170° (Graziani's method).

Analysis : 5.983 mg. subst. gave 1.18 cc. N_2 (758 mm., 14) N=11.62%
7.556 〃 〃 〃 1.50 cc. 〃 (〃 〃) N=11.58%
Calc. for $C_6H_{12}O_4N_2S_2$ N=11.66%

(3) Composition of diets.

In order to determine the effect of cystine upon the supplementary value of "miso-protein" added to rice-protein, "yedomiso", "sendaimiso" and "hatchōmiso" were used. The control animals received the diet shown in the following table while the test animals were fed on the same diet to which 0.5% of l-cystine was added daily. To the animals, fed on "sendaimiso", was given also 0.1 or 1.0% of cystine.

TABLE II.—*Composition of diets (g.).*

Experimental diet	(I) "Yedomiso" diet	(II) "Sendaimiso" diet	(III) "Hatchōmiso" diet
Polished rice*	73.2	73.2	73.2
Potato starch*	——	5.6	9.7
"Yedomiso"*	22.3	——	——
"Sendaimiso"*	——	19.5	——
"Hatchōmiso"*	——	——	13.1
Ash of "Sendamiso"	2.1	——	2.0
Calcium carbonate	1.0	1.0	1.0
Soy-bean oil	1.1	0.7	——
Butter**	5.0	5.0	5.0
Orizanin (cc.)***	5.0	5.0	5.0
Rice-protein	5.76	5.76	5.76
"Miso-protein"	5.00	5.00	5.00
NaCl	4.5	4.5	4.5

* As dry matter.
** Preparation of the Meiji Confectionary Company.
*** 〃 〃 the Sankyo Pharmaceutical Co.

The control animals were fed on the above diets alone while the test animals were supplied with 0.1%, 0.5% or 1.0% cystine daily.

(4) Feeding methods and observations.

The rats used in the experiments were of pure albino stock of the same breeder, the age ranging from 38～43 days and weighing from 40～50 g..

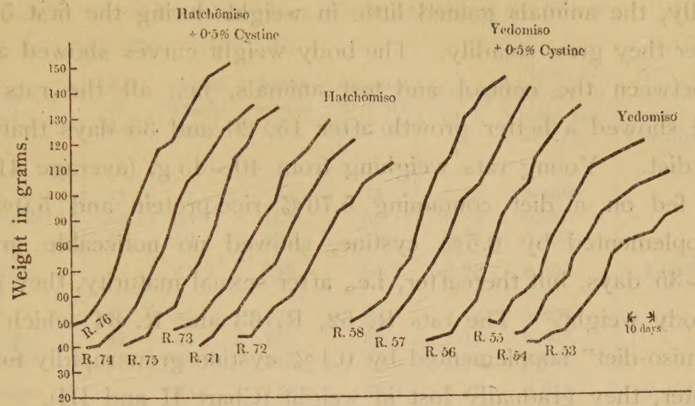

Chart I.—The curves of male rats fed on "miso" diet and of those fed on the same diet supplemented by 0.5% cystine.

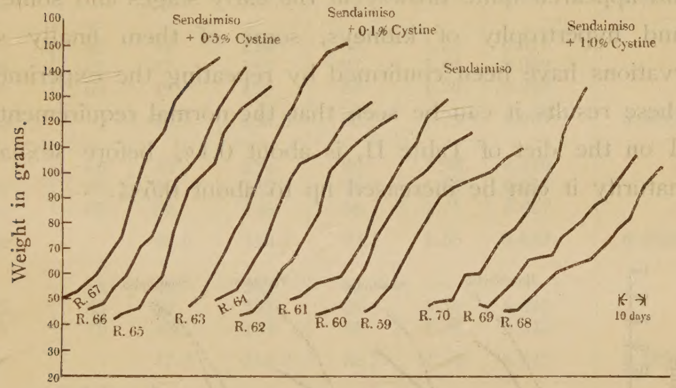

Chart II.—The curves of male rats fed on the "sendaimiso" diet and of those fed on the same diet supplemented by 0.1, 0.5 or 1.0% cystine.

During the experiments of 62 days from Oct. 30, 1934, the test animals were kept on a definite amount of the diets per kg. of body weight, as shown in the following table:

TABLE III.—*Intake of Nutriment.*

Intake \ Period in days	I 10	II 9	III 7	IV 7	V 8	VI 9	VII 12
Diet (g.)	152.2	146.5	134.0	125.0	103.9	100.6	86.6
Protein (g.)	16.4	15.8	14.4	13.5	11.2	10.8	9.3
Calorie	626.1	605.5	552.0	514,9	428.4	416.0	356.7

The diet was calculated so as to contain the same protein and calorie per kg. of the body weight, according to the R. Sasaki's table(8).

Generally, the animals gained little in weight during the first 5～6 days but thereafter they grew steadily. The body weight curves showed a decisive difference between the control and test animals, i.e., all the rats supplied with cystine showed a better growth after 15, 20 and 35 days than those of the control diet. Young rats weighing from 40～45 g. (average 41 days of age), when fed on a diet containing 5.76% rice-protein and 5.0% "miso-protein" supplemented by 0.5% cystine, showed no noticeable growth for the first 15～35 days, but thereafter, i.e., after sexual maturity, they gradually gained in body weight. The rats R. 62, R. 63 and R. 64 which received the "sendaimiso-diet" supplemented by 0.1% cystine grew rapidly for 40～45 days, but later, they gradually lost in weight (Chart II and III).

Those fed on "sendaimiso" supplemented by 1.0% cystine gained very slowly in weight during the first 30 days. In some cases they suffered from diarrhoea and appeared quite drowsy in the early stages and some developed nephrosis and hypertrophy of kidneys, some of them finally succumbed. These observations have been confirmed by repeating the experiment.

From these results it can be seen that the normal requirement of cystine for rats, fed on the diet of Table II, is about 0.1% before sexual maturity and after maturity it can be increased up to about 0.5%.

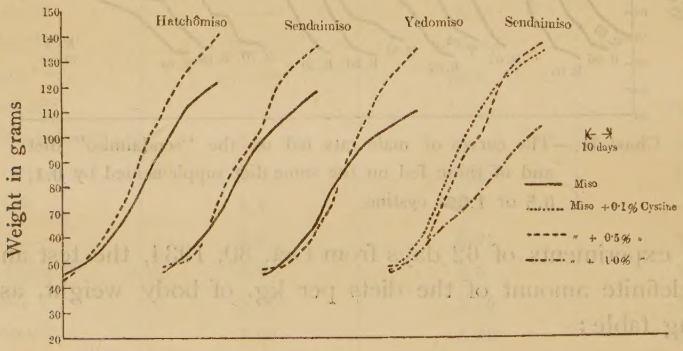

Chart III.—Showing the average growth curves calculated from Chart I and II.

As the developement of acute nephrosis or hypertrophy of the kidneys is of great interest in this experiment, the relative weight of the kidneys to the body weight, i.e., K/B of the control and test animals and the per cent deviation from normal kidney weights were estimated according to the method of B. B. Longwell, R. M. Hill and R. C. Lewis⁽⁹⁾ who have used it for the determination of the renal hypertrophy caused by the over doses of cystine and protein in the diet. The results are summarized in the following table:

TABLE VI.—*Body Weight and Size of the Kidneys.*

Experimental diet	No. of Rat	Initial weight (g.)	Final weight (g.)	Increase in body wt. (g.)	Kidney (g.)	Ratio of kidney to body wt. (K/B)	K/B of normal rat by Donaldson	Per cent deviation from normal (Donaldson)
"Yedomiso"	53	41	99	58	1.21	0.009*		——
	54	45	108	63	0.75	0.007		−26.1
	55	50	122	72	0.80	0.007		−28.6
Average		45.3	109.7	64 3	0.92	0.007	0.0091	−27.4
〃 +0.5% cystine	56	43	127	84	1.15	0.009		+14.0
	57	45	133	88	1.17	0.009		— 2.5
	58	49	142	93	1.63	0.011		+20.3
Average		45.7	134.0	88.3	1.32	0.010	0.0091	+10.6
"Sendaimiso"	59	45	111	66	0.90	0.007**		——
	60	44	115	71	0.78	0.007		−27.1
	61	50	131	81	0.91	0.007		−23.4
Average		46.3	119.0	72.3	0.86	0.007	0.0091	−25.3
〃 +0.1% cystine	62	44	124	80	1.25	0.010		+ 9.9
	63	47	152	97	1.43	0.009		+ 5.9
	64	49	129	80	1.20	0.009		+ 1.8
Average		46.7	135.0	86.7	1.29	0.009	0.0091	+ 6.2
〃 +0.5% cystine	65	42	134	88	1.38	0.010		+13.7
	66	46	142	96	1.51	0.011		+18.7
	67	50	146	96	1.75	0.012		+34.3
Average		46.0	140.7	93.3	1.55	0.011	0.0089	+22.2
〃 +1.0% cystine	68	46	103	57	——	——		——
	69	48	107	59	1.39	0.012		+38.7
	70	48	134	81	1.64	0.012		+34.9
Average		47.3	114.7	66.7	1.52	0.012	0.0092	+36.8
"Hatchōmiso"	71	41	122	81	1.05	0.008***		——
	72	44	112	68	0.82	0.007		−21.2
	73	46	129	83	1.01	0.008		−13.9
Average		43.7	121.0	77.3	0.96	0.008	0.0091	−17.5
〃 +0.5% cystine	74	40	137	97	1.43	0.010		+15.9
	75	41	134	93	——	——		——
	76	49	152	103	1.65	0.019		+22.2
Average		43.3	141.1	98	1.54	0.015	0.0089	+19.1

*, **, *** Calculated for the rats weighing 133, 135 and 130 g. respectively.

We see from the above table that the relative weight of the kidneys to the body weight (K/B) of the rats fed on "yedomiso" diet, supplemented by 0.5% cystine was much greater than those of the same age on the control diet (R. 53, R. 54 and R. 55) being 0.010 against 0.007. The ratio K/B of the rats fed on "sendaimiso" diet alone and those supplemented by 0.1, 0.5 and 1.0% cystine were estimated to be 0.007 against 0.009, 0.011 and 0.012 respectively.

This shows that the size of the kidneys is nearly proportional to the cystine content in the diet. As the ratio K/B of rats which received 0.1% cystine are nearly the same as those of normal rats as observed by H. H. Donaldson(10), it is evident that 0.1% cystine in the diet has no influence upon the renal hypertrophy.

The K/B of the control rats fed on "hatchōmiso" diet was 0.008 while those supplemented by 0.5% cystine was 0.015. The highest ratio of all the experimental animals was 1.8 times of the normal rats as described by Donaldson.

SUMMARY

(1) Feeding experiments have been carried out with albino rats in order to study the effect of cystine upon the nutritive value of "miso-protein" when added as a supplement to rice diet.

(2) It has been proved that an adequate amount of cystine increases the nutritive value of "miso-protein", but the amount to be given largely depends upon the age of the animals.

(3) For young rats until sexual maturity the optimum amount was found to be about 0.1% of the diet. The addition of 0.5~1.0% retards the growth and produces an acute nephrosis or hypertrophy of the kidneys, but for the adult rats over 120 g., 0.5% cystine shows a favorable effect upon growth without any noxious effects.

(4) The degree of hypertrophy of the relative weight of the kidneys to the body weight (K : B) was found to be nearly proportional to the amount of cystine added.

It is a pleasure to acknowledge the continual guidance and suggestions of Professors U. Suzuki and R. Sasaki and also the advice and interest of Professor K. Masui who made the examinations of kidneys and liver.

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ABSTRACTS
from
TRANSACTIONS published in JAPANESE

(Pages refer to the Japanese originals of this volume unless otherwise noticed)

On Unsaponifiable Substances especially Sterol in the Oil of "Tamari". (pp. 715～719): By Kenji MIYAJI and Mamoru KANEKO. (Agricultural College of Gifu, Japan)

Enzymatic Studies on the Venom of Snakes, Part I.—On the Activation of Peptidase by the Venom of Snake [Trimeresurus mucrosquamatus (Cantor)] (1). (pp. 720～730): By Yoshio TSUCHIYA. (Laboratory of Nutrition Chemistry, Faculty of Science and Agriculture, Taihoku Imperial University, Japan)

The investigation on the influence of the venom of snake upon dipeptidase is not only very interesting from the standpoint of the study of the so-called "activators or inhibitors", but also of a great significance from the view-point of finding, if possible, the specificity of the action of dipeptidase complex.

But, as no investigation of this kind can be found in the literature, as far as the author knows, the present investigation was undertaken and the following results were obtained:

(1) The venom of snake (Taiwan-habu) activated remarkably the LG-cleavage of dipeptidase of the extract of dried liver of tortoise as well as that of the fresh or dried intestinal mucous membrane of pig.

(2) This activation phenomenon was dependent upon the lengths of time of contact of the enzyme extract and the venom solution before digestion experiment:—namely, the longer the time of standing of the mixture, the less the power of activation of the enzyme (dipeptidase). This relation was somewhat different in its degree according to the enzyme materials used.

(3) This activation phenomenon was brought about to the maximum by a definite quantity of the venom for a definite quantity of the enzyme extract, and the quantity of the venom requiring for the maximum activation was nearly proportional to the quantity of enzyme extract used.

(4) Generally speaking, the power of activation of the venom solutions was comparatively stable under given conditions.

(5) Comparing the two pH-activity-curves, with and without the venom,

the activation was clearly observed throughout all the pH-range and sharp optimum activation at optimum pH-zone.

(6) In the case of using the extract of dried liver of tortoise, the activation of the venom was found to be strong upon the cleavages of leucylglycine, while rather weak upon the cleavage of valylglycine, and none the cleavages of glycylglycine and alanylglycine under given conditions.

Researchs on Viscose Pulp and Viscose Pulp woods. Part VI.—On the microbiological decay of Japanese beech. (pp. 730∼733): By Masuzo SHIKATA and Isami TUTIYAMA. (Chemical Laboratory for Forest Prod., Kyoto Imp. University)

In the Part I of the present report, we have pointed out that we might be able to get good soda pulp from Japanese beech (Fagus Sieboldi, Endl.). One of the serious defaults of Japanese beech as pulp wood, is the easiness, with which beech is attached by the micro-organism. In the present paper, the results of the chemical analyses as well as the cooking test were described. It was found that rot, when it dose not so far as to give zone lines to the wood, does not give serious damage to the pulp qualities, but results in the poorer pulp yield than the ordinary wood.

Researches on the Electrolytic Reduction Potential of Organic Compounds. Part 22.—Some consideration on the mechanism of the electrolytic reduction. (pp. 734∼740): By Isamu TACHI. (Agricultural Chemical Institute, the College of Agriculture, Kyoto Imperial University)

I have observed the behaviour of a small drop of difficullt soluble organic compound such as nitrobenzene, camphor oil and carbontetrachloride on the mercury cathode with small surface by a photographic method.

It was found that the drop of each organic compound became gradually flat on the cathode surface by polarization, and then it had a tendency to restore its original state again by further polarization. This phenomena agreed with the electrocapillary phenomena of a polarized mercury.

The contact angles of organic compounds to mercury as well as the changes of the angles with polarization differed from one another owing to their characters as well as the natures of electrolyte solutions. Camphor oil became most flat than nitrobenzene and carbontetrachloride. Nitrobenzene became more flat in alkaline medium than in acidic medium.

With these facts, the mechanisms of the reduction of nitrobenzene and that of camphor were discussed.

On the Vitamin (A and B) of Maize. (pp. 741～749): By E. TAKAHASHI and G. MASUDA.

The comparative research of the vitamin content was made of five kinds of maize which was produced in Hokkaido.

The materials used were as follows:

a. Long fellow—a flint corn with yellow pericarp.
b. Yellow dent corn—a dent corn with yellow pericarp.
c. North eastern—a flint corn with red pericarp.
d. Hall F. golden nugget corn—a flint corn with reddish yellow pericarp.
e. White dent corn—a dent corn with white pericarp.

For the determination of vitamin A, crude fat material was first prepared from each sample and was treated according to the methods of Carr-Price modified by Rosenthal and Erdélyi. At the same time the biological experiment was carried out with albino rats.

The results of the chemical and biological tests were agreed fairly well and showed that the sample from highly yellow coloured Hall F. golden nugget corn contained the factor was abundantly, while white dent corn did not contain approvable amount of the vitamin. Further, the result showed that there exists a close relation between vitamin A and yellow pigment of their endosperms and no association with the colours of the pericarp of corns.

For the test of vitamin B the antineuritic concentrate was first prepared by the method of Jansen and Donath and the qualitative tests were conducted with it according to the formaldehyde azo test of Kinnersley and Peters. The curative test was made also with pigeons.

The result showed that the vitamin B content of maize did not differ greatly in each varieties and the colour of pericarp or endosperm was without effect upon the content of the factor. Result also showed that pigeon required approximately from 60 to 120 percent of whole corn at the diet to produce the normal growth.

Studies on Tea-leaves, III.—On the Chemical Constitution of Tannin in Tea-leaves. (pp. 750～756): By Yasuyoshi OSHIMA. (Taihoku Imperial University)

Studies on Tea-leaves. IV.—Contribution to the Knowledge on Chemistry of Eyzymes in Manufacturing Black-tea. (pp. 757~759): By Y. OSHIMA and K. HAYASHI. (Taihoku Imperial University)

Studies on Vitamin C. XV.—The Correlation between the Effects of Vitamin C and the Method of its Administration (2). (pp. 760~766): Tomiji MATSUOKA. (Agricultural College, Kyoto Imperial University)

On the Presence of Phlobaphene and "Durasantalin" among the Colouring Matters of the Manchurian Kaoliang (Andropogon sorghum, Brot). (pp. 767~772): Koji OKANO and Iwao OHARA. (At the Central Laboratory of the South Manchuria Railway Co.)

We reported in the previous paper (1) the presence of apigenin (5, 7, 4′ trioxyflavone) among the colouring matters of the hulls of Manchurian Kaoliang. In the present investigation we were able to isolate phlobaphene from the ether-insoluble fraction and "durasantalin" from the acetone-soluble part of the colouring matters. The former substance, the yield of which is about 43% of all colouring matters, is insoluble in water and can be separated by the difference of solubilities in the following solvents into several fractions with different glucose contents.

	Fraction	Glucose content (%)
1.	Soluble in acetone	5.9
2.	Insoluble in acetone, but soluble in methylalcohol	10.6
3.	〃 〃 〃 and insoluble in 〃	5.6

Each product has red- or dark-brown colour and is proved to be the condensation product (phlobaphene) of Kaoliang tannin (catechol tannin) by showing the presence of phloroglucin and protocatechuic acid in the products of its alkalifusion and catechol in those of dry-distillation. The second product we isolated seems to be identical with "durasantalin" which was first isolated from "red dura" by A. G. Perkin.(2) We obtain it at about 35% of all colouring matters of the hulls. Its analytical numbers are shown as follows: Found C 67.45, 67.26%, H 4.44, 4.73%, M.W. 808, 843; Calculated as $C_{48}H_{39}O_{15}$ C 67.37%, H 4.56%, M.W. 855. The absorption spectrum of this compound in ultra-violet rays is also shown in this paper. The action of fused alkalis at 220~260°C results the formation of phloroglucin and *p*-oxybenzoic acid but no *p*-oxyacetophenone. On the other hand the colouring matters of its seed-coat are isolated by boiling with dilute acetone and are separated into the fractions as done in the case of the hulls with the following results:

	Fraction	% of all colouring matters	Substance
1.	Soluble in methylalcohol and soluble in acetone	15	"durasantalin"
2.	〃 〃 〃 but insoluble 〃 〃	21	phlobaphene
3.	Insoluble in methylalcohol	61	

All colouring matters are obtained, about 2% of seed coat.

Apigenin is not found to be present in this material, yet tannin is isolated from the water soluble part of extracting fluid with the yield of 3% of the seed coat.

LITERATURE

(1) Bull. of the Agri. chem. soc. of Japan, **10**, 109 (1934).
(2) A. G. Perkin: J. chem. Soc., **97**, 220 (1910).

Eel Oil (I).—Fatty Acids. (pp. 773~780): Toyoki ONO. (Agricultural College, Tokyo Imperial University.)

The Carr-Price reaction no takes place on a sample and the ether-extracts from living cells, but only gives the extract from liver so weak reaction as C.L.O. unit=0.8.

Saturated acids:

Myristic acid, palmitic acid, stearic acid and an acid of m.pt. 57~58°C were obtained from alcohol solution by the fractional crystallization.

Unsaturated acids:

After the distillation to 28 fractions of the methylesters of acids separated the bromides from each fraction with various organic solvents. The occurence of the following acids is considered through the examination of bromides.

$C_{14}H_{26}O_2$, $C_{16}H_{30}O_2$, $C_{18}H_{34}O_2$, $C_{18}H_{32}O_2$ (iso-acid), $C_{18}H_{28}O_2$, $C_{20}H_{32}O_2$, $C_{22}H_{34}O_2$, $C_{16}H_{26}O_2$ (?), $C_{20}H_{30}O_2$ (?), $C_{16}H_{24}O_2$ (?).

Chemical Studies of Chinese Oil Tung Seed. II.—On the physico-chemical properties of a few proteins extracted from the seed of Aleurites fordii. (pp. 781~788): By Peh-Wung LIU. (Chemical Laboratory of Hokkaido Imp. University)

On Mould Preventing Action of α-Oxy-Caprinic Acid in "Shoyu". (pp. 789 790): By Yataro KOBATA (Biochemical Laboratory of Agricultural College of Kyoto Imp. University)

Studies on the Amylase of Yeast. II.—On the Preparation of Anylase Solution from dry Yeast (2). (pp. 791∼795): By Kazuki ONO. (Taihoku Imperial University)

Studies on the Amylase of Yeast. III.—On the Preparation of Amylase Solution from dry Yeast (3). (pp. 796∼802): By Kazuki ONO. (Taihoku Imperial University)
